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B01J 19/00, G01N 21/07 (75) Inventors/Applicants (for US only): KELLOGG, Gregory, J. [US/US]; 137 Magazine Street #1, Cambridge, MA 02139 (US). DUFFY, David [US/US]; 18 Forest Street, #18, Cambridge, MA 01239 (US). PELTA, Aaron [US/US]; 33 Seminary Hill, West Lebanon, NH 03784 (US).
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- (71) Applicant (for all designated States except US): TECAN TRADING AG [CH/CH]; Haldenstrasse 5, 6342 Baar (CH).
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(54) Title: MICROFLUIDICS DEVICES AND METHODS FOR HIGH THROUGHPUT SCREENING

(57) Abstract: This invention relates to methods and apparatus for performing microanalytic and microsynthetic analyses and procedures. The invention provides a microsystem platform and a micromanipulation device for manipulating the platform that utilizes the centripetal force resulting from rotation of the platform to motivate fluid movement through microchannels. These assays may be performed for a variety of purposes, including but not limited to screening of drug candidate compounds, life sciences research, and clinical and molecular diagnostics. Methods specific for the apparatus of the invention for performing any of a wide variety of microanalytical or microsynthetic processes are provided.

# MICROFLUIDICS DEVICES AND METHODS FOR HIGH THROUGHPUT SCREENING

## BACKGROUND OF THE INVENTION

5 This application claims priority to U.S. Provisional Applications Serial Nos. 60/204,272 and 60/204,273, each filed May 15, 2000, the disclosure of which is explicitly incorporated by reference herein.

### 1. Field of the Invention

10 This invention relates to methods and apparatus for performing microanalytic and microsynthetic analyses and procedures. In particular, the invention relates to microminiaturization of genetic, biochemical and bioanalytic processes. Specifically, 15 the present invention provides devices and methods for the performance of miniaturized biochemical assays. These assays may be performed for a variety of purposes, including but not limited to screening of drug candidate compounds, life sciences research, and clinical and molecular diagnostics. Methods for performing any of a wide 20 variety of such microanalytical or microsynthetic processes using the microsystems apparatus of the invention are also provided.

### 2. Background of the Related Art

Recent developments in a variety of investigational and research fields have 25 created a need for improved methods and apparatus for performing analytical, particularly bioanalytical assays at microscale (*i.e.*, in volumes of less than 100  $\mu$ L). In the field of pharmaceuticals, for example, an increasing number of potential drug candidates require assessment of their biological function. As an example, the field of 30 combinatorial chemistry combines various structural sub-units with differing chemical affinities or configurations into molecules; in theory, a new molecule having potentially unique biochemical properties can be created for each permutation of the sub-units. In this way, large libraries of compounds may be synthesized from relatively small numbers of constituents, each such compound being a potential drug lead compound of 35 usually unknown biological activity and potency.

More traditional approaches to compound library development are also yielding growing numbers of candidates, including the use of naturally-derived compounds